COLORADO CONSERVANCY

SOIL CONSERVATION SERVICE BULLETIN

PROJECT 01-8
COLORADO SPRINGS
COLORADO

MAY & JUNE 1936

AGAIN DUST AND FLOOD

The smothering dust clouds which hovered over Colorado's portion of the Nation's Dust Bowl were rapidly replaced by swirling flood waters. The relation between dust-covered land and fast-falling rain is readily understood by those who have observed the shedding action of the flour-silt covering of the former drouth-stricken areas. As high as 90 percent accelerated run-off was recorded from these non-absorptive soils. From these unprotected lands came the rolling flood waters which cost human lives and thousands of dollars to private and public property.

In the Soil Conservation Service areas at Cheyenne Wells and Springfield, water was held and stored in the soils where it fell. Inestimable value will be given by this moisture percolation accomplished by the use of contour furrows and small water-conservation dams on the range lands and the use of terracing and contour cultivation on the cultivatable areas. Damage to the furrows was negligible and only occurred where untreated, non-cooperative land above allowed the uncontrolled waters to sweep into controlled sections.

People of southeastern Colorado who watched the workings of furrows and terraces enthusiastically report the tremendous water conservation that took place in the Service areas. Water in some instances was backed up 8 to 10 feet behind these structures. The proof of these observations is shown by testing the soil for penetration of moisture after the rains. At the Springfield CCC Camp moisture penetration on contour-furrowed pastures averaged 23½ inches. Land not contoured in same area was but 14 inches. Terracing in the cultivated fields allowed water to penetrate an average of 41 2/3 inches. Comparing this to a cultivated field not terraced, moisture was shown to have percolated but 11 inches. Storage of moisture in these soils needs no explanation as to benefits.

The Editor

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TREE AND SHRUB PLANTING

The various cooperators and others interested in the Soil Conservation work will, no doubt, want to know what has been done in the way of tree and shrub planting. A total of approximately 1,200,000 trees were planted this spring on the various projects in the State. Lack of moisture in April made it impractical to do any early planting and as a result we did not plant as many trees as planned. Trees held over have been lined out in the nursery and will be used next year.

The planting of snowberry, also known as buck brush, and willows will be continued through June and part of July. Experience has proved that these shrubs can be easily moved during the growing season. This is advantageous in that it lengthens the planting season and makes it possible to accomplish more than we could otherwise.

In several cases cooperators have been somewhat disappointed in that we could not plant trees as planned. We hope you will all have patience in this matter and rest assured that trees agreed upon will

be planted as soon as there is reasonable assurance of success. The work of preparing sites will continue so as to preserve moisture for planting in the spring of 1937.

One feature that is of special interest is a means of diverting runoff water into the area to be planted for shelterbelt purposes. This is done by means of ditches on a slight grade. In the Springfield area water has penetrated to a depth of more than six feet. This deep moisture is the life of trees in most cases.

In this connection it is timely to again urge the protection of trees from livestock and the cultivation of shelterbelts to eliminate weed and grass competition. In most places in Colorado, trees will do well if given a chance. On the other hand, you cannot raise cattle, hogs, or chickens on the same ground as you are raising trees and expect both to do well.

H. D. Petheram, Chief Forester

-----SOIL CONSERVATION SERVICE-----

NATIVE GRASSES

"Of all the plants of the earth the grasses are of the greatest use to the human race. To the grasses belong the cereals, sugarcane, sorghum, and the bamboos; and, since they furnish the bulk of the forage for domestic animals, the grasses are also the basis of animal industry.

"The grasses furnish the principal breadstuffs of the world and a large part of the food of domestic animals; they are also used in the industrial arts and extensively as greensward and ornamentals in parks and gardens." - A. S. Hitchcock, in the "Mannual of the Grasses of the United States."

Grasses have become so much a part of man's economic scheme that they have acquired a commonplace position in his life and thought. When bread is advertised as man's most abundant and cheapest food, few people stop to consider the total value of the world's grain production. Nature has provided so many millions of acres of pasture land that man has come to take the presence of grass for granted. Not only has he failed to appreciate the cash value of grassland, but also he has failed to realize the economic loss that would result from mistreatment of pastures and the destruction of grass cover.

The total cash value of all grass crops, including cereals, produced in the United States each year approaches five billion dollars. Pasture grasses contribute four hundred million dollars to the total.

In addition to their perennial value as producers of forage, our native grasses are the most important single factor in the prevention of erosion. Improper use of pastureland, especially overgrazing during drought periods, and the plowing of grassland unfit for crop production have seriously damaged the natural cover of native grasses, with consequent acceleration of erosion.

Erosion, in turn, continues the destruction of the grass cover, and so the process goes on and on. The two chief by-products of erosion, floods and dust storms, have reached the proportions of national menaces. The total national loss through erosion is estimated at $400,000,000 annually. This is equal to the total annual value of our pasturelands.

Both wind and water erosion can be checked only by a restoration of the normal cover of grasses to the land. In arid regions, such as the western plains of the United States, the restoration of vegetation to areas denuded by cultivation or erosion is an exceedingly slow process. Fields abandoned for ten or twelve years still contribute dust to every breeze. After thirty or forty years the vegetative cover still allows

an abnormal run-off of rainfall.

Conservation specialists are exploring the world for plants which will thrive in denuded arid regions, with hopes of finding a means to assist nature in the halting of erosion and its attendant floods and dust storms. Many promising species have been found and are being grown in experimental gardens for further observation. However, at present our native grass species are furnishing the most available and most satisfactory erosion-control plants.

Of the 250 species of grass native to Colorado, some twenty-five or thirty are proving of special value in erosion control. Most important of these are: Buffalo grass (Buchloe dactyloides), Blue Grama (Boutoloua gracilis), Western Wheatgrass (Agropyron smithii), Switchgrass (Panicum virgatum), Bluestem grasses (Andropogon species), Canadian Ryegrass (Elymus canadensis) Galleta (Hilaria jamesii), Saltgrass (Distichlis stricta and Salt Sacaton(Sporobolus airoides).

Further information concerning our native grasses can be found in the following books, which are available at most public libraries:

Clements, Frederic E. and Edith S. - Rocky Mountain Flowers - Flower Families and Ancestors

Ramaley, Francis - Colorado Plant Life

Hitchcock, A. S. - Manual of Grasses of the United State

Silveus, W. A. - Texas Grasses.

By Wayne W. Ward, Junior Agronomist
Soil Conservation Service

-----SOIL CONSERVATION SERVICE-----

Civilization is most secure where soils are fertile, water is abundant, and both are properly used.

"Little Waters"

Switchgrass (Panicum virgatum)

Switchgrass is very common in the meadows and moist regions in Colorado and is one of the best forage plants while young and tender. As it reaches maturity the leaves and stems become coarse and tough, not being relished by livestock. Where there is enough available moisture, this species grows in large clumps or bunches and occurs in rather dense stands in meadows. It is not prevalent in large quantities on the plains in Colorado, due to lack of sufficient moisture. It is a chief constituent of meadow hay and produces a large quantity of good feed.

In good stands, Switchgrass will grow in height from 3 to 6 feet; normally about 3 feet. It produces a large seed crop and is easily threshed. The seeds are small, oval-shaped, with tapered ends. The head is a loose panicle, spreading profusely at maturity. Reproduction occurs both from seed and from vigorous rhizomes (underground stems).

Galleta (Hilaria jamesii)

Galleta is found in Colorado only in the southern half of the state. It is a perennial bunchgrass occurring in rather dense stands on the mesas and alkaline or salty flats. As a forage plant, Galleta ranks very high, being particularly good for horses and cattle. In addition to being a good forage plant, it is very drought enduring, a fact which makes it well worth protecting for greater use in regions where found.

The head is a rather dense spike, producing a rather poor seed crop. The seeds are small and at maturity are surrounded by a large number of fuzzy hairs. It grows in height from 10 to 18 inches, yielding a fair quantity of good pasture. The stems are slender and the leaves are curly and do not become coarse at maturity.

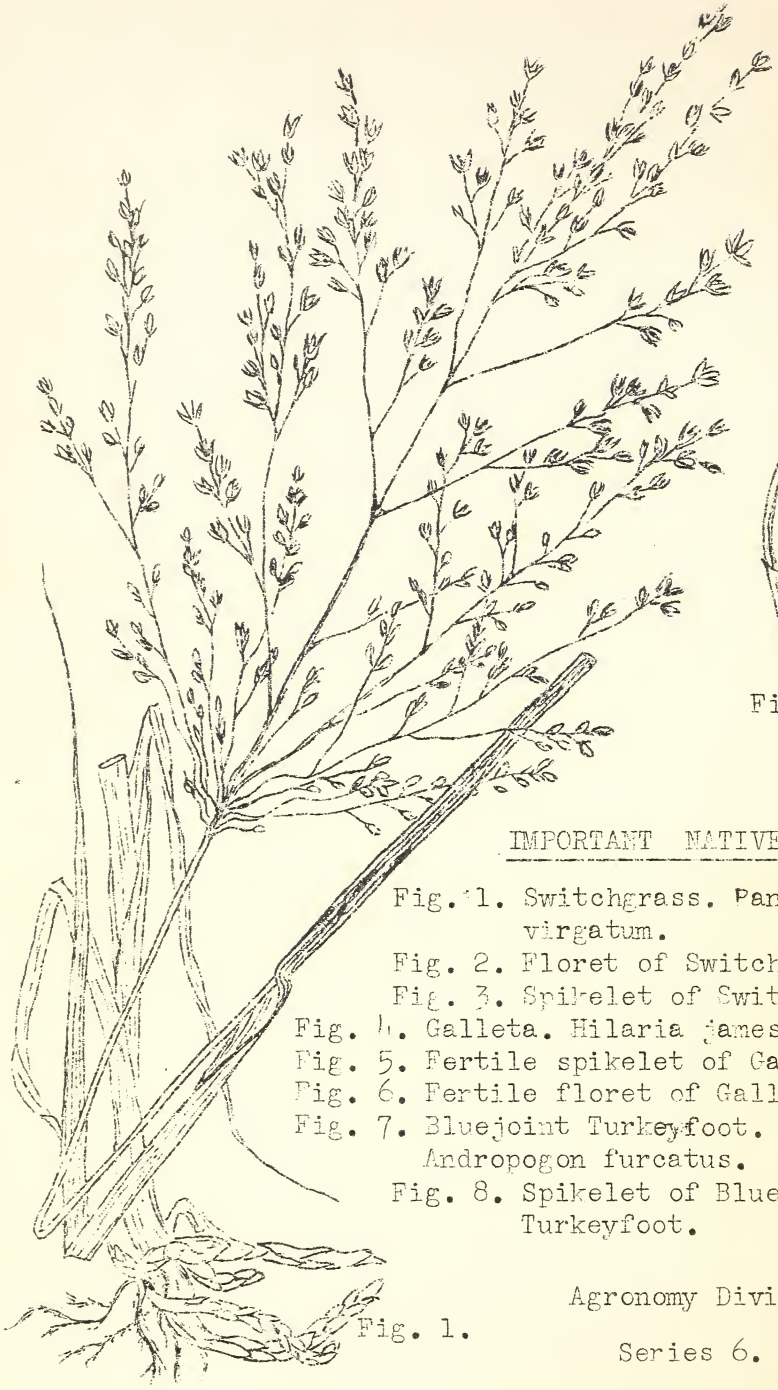

Fig. 1.

Fig. 2.

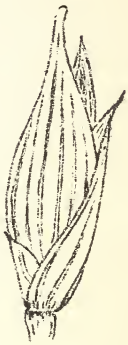

Fig. 3.

IMPORTANT NATIVE GRASSES.

Fig. 1. Switchgrass. Panicum virgatum.
Fig. 2. Floret of Switchgrass.
Fig. 3. Spikelet of Switchgrass.
Fig. 4. Galleta. Hilaria jamesii.
Fig. 5. Fertile spikelet of Galleta.
Fig. 6. Fertile floret of Galleta.
Fig. 7. Bluejoint Turkeyfoot. Andropogon furcatus.
Fig. 8. Spikelet of Bluejoint Turkeyfoot.

Agronomy Division

Series 6.

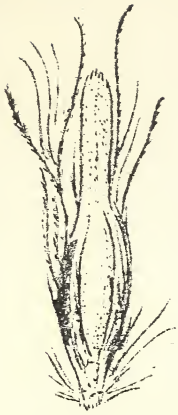

Fig. 5.

Fig. 8.

Fig. 6.

Fig. 4.

Fig. 7.

Bluejoint Turkeyfoot (Andropogon furcatus)

This species is very common in eastern Colorado in coarse, gravelly or sandy soils where moisture penetration is good. Consequently, it is not found in the valleys where the soils are hard and compact or on the mesa tops, which have well matured soil. Under certain conditions it grows in rather dense stands, but is usually found in scattered bunches and is very tall, ranging from 3 to 6 feet. The stems are coarse, having two, three or four pronged heads, and broad leaves which have a reddish case at maturity and a cluster of hairs at the base.

Bluejoint Turkeyfoot while young and green is a fairly good forage plant for horses and cattle, but is not grazed extensively by sheep. On the mixed prairies it is often cut for hay, and if cut while green and tender is very good feed. When the plants reach maturity, the stems and leaves become coarse and tough and are not eaten readily. However, the mature grass makes rather good winter forage for cattle and horses.

Reproduction occurs both by seed and by vegetative growth from the crown and sometimes by short rhizomes. Vegetative reproduction is the most vigorous of the two, as the seed habit is weak and no viable seed is produced some seasons. The seed matures in August and early September.

The range of Bluejoint Turkeyfoot is wide, extending from Maine to New Mexico. It is a constituent of the mixed-grass type of vegetation, occurring in abundance throughout the Great Plains states in districts suitable for its growth.

This grass is often not well liked by stockmen, due to its coarseness, but it is a good soil binder and the quantity of forage produced makes it equivalent to many of the more palatable grasses which produce much smaller yields.

C. W. Frutchey
Junior Agronomist

A complete knowledge of soils and soil fertility is imperative to the individual who is concerned with the economics of agricultural lands. To know the productive capacity of a farm is important to the farmer who must cultivate the soil. It is equally important to the banker who is loaning money on the land. Bad judgment on soil fertility will put either one out of business.

We often fail to realize that productive soils are vital living matter and the soil, like all other living matter, is subject to marked variation in degree of fertility. Variations are noticeable even within a few feet, and they may become tremendously important over areas of a few thousand acres.

The point may be illustrated by comparing soils of two soil conservation demonstration projects. Cherry Creek and Black Squirrel Creek. They are separated by a thin line or the Platte-Arkansas Divide. The soils of one area are made up of a large body of deep, fertile material, which, when properly managed to prevent loss by erosion, will produce satisfactory yields for many years. These soils are worth $10 or $20 per acre (dry land) on the basis of the productive capacity.

Across the line in the other area the situation is much different. The soils over there are potentially infertile. They are light in texture, they are low in moisture-holding capacity, which makes them dangerous from a flood standpoint, and they are low in plant food. With few exceptions they should never be cultivated. They are at best short-lived. We often refer to these soils as "10-year soils", because after 10 years of cropping they will no longer produce a living for the farmer, nor will they pay off the mortgage to the banker. They are, however, good native pasture lands and when properly grazed will pro-

10 bably have an appraised value of $2.50 or $3.00 per acre.

A knowledge of how to determine the productive value of soils would prevent a lot of headaches between the farmer and the business man who may be concerned. To determine this productive capacity it is necessary to make an inventory of the numerous factors which control production. Depth of soil, texture, moisture-holding capacity, speed of percolation, organic matter content, alkalinity, slope, and available plant foods are all important, any one of which may be the limiting factor that would place a soil in a potentially infertile group.

The soil conservation program takes into consideration all factors which affect the fertility of soils. By means of moisture conservation and accepted farm management methods an effort is made to maintain or build up production on the basis of adaptability. Erosion losses are most frequently the cause of Colorado's soil problems. Since the top layer of the soil is richest in plant food and is the feeding ground for plant roots, this process known as erosion involves a definite loss of valuable material, and after it becomes sufficiently intense may lead to the complete destruction of the soil as a seat of plant life. The fertile topsoil layer on most of our Colorado soils is quite thin. Removal of six inches of the top will frequently reduce the yielding capacity 25 to 40 percent. Removal of 12 to 14 inches of topsoil is far too common on our cultivated lands.

The Soil Conservation Service has completed detailed erosion surveys on 586 farms representing 283,000 acres in the 11 Colorado areas. Without exception erosion which could have been avoided has been found to have damaged the productivity of every one of these farms. Of the 283,000 acres mapped, approximately 16,000 acres have been abandoned, and the productive capacity of another 25,000 acres has been reduced from 25 to 75 percent. In far too many instances the dam-

age has gone beyond immediate repair. Available evidence indicated that nature requires from 25 to 50 or more years to return a severely eroded field to its normal stand of native grasses. Man, by the use of modern though expensive methods, may be able to hasten the repair.

The work done by the Soils Division to date is a fair cross-section of the situation as it exists in Colorado. Is it not time that the owners and operators of Colorado's 44,960 farms take inventory of their present soil productivity in preparation for what may happen in the future?

(Editor's Note: The above article was prepared by John Spencer, Chief Soils Expert, Colorado. The value of the operations of the Soils Division in the Soil Conservation Service is clearly set forth.)

-----SOIL CONSERVATION SERVICE-----

SOIL CONSERVATION SERVICE COOPERATING WITH STATE OFFICIALS

In cooperation with State Penitentiary Officials, the Soil Conservation Service has been supervising an erosion control program on one of the state prison farms three miles east of Canon City, Colorado.

The work has been concentrated on a drainage area of approximately 800 acres where the land has been badly gullied due to a concentration of run-off waters from 200 acres of poorly vegetated sandy soil lying above the prison farm. A large gully constitutes the main erosion problem on this drainage. This gully is approximately one mile long, 100 feet in width and from 10 to 20 feet in depth, with numerous small gullies coming into it.

Efforts were made to control this gully two years ago when two large earth-fill dams were constructed. These dams have caused the deposition of thousands of tons of silt and have prevented a considerable amount of erosion along the main gully.

Since the U. S. Soil Conservation Service has been furnishing technical assistance to the State Officials, a complete control program has been inaugurated. Diversion ditches, contour furrows and earth-spreader dikes have been constructed and several thousand cubic yards of rock quarried, all by hand labor. The rock is being used in the construction of check dams, drops, and other small structures. Two wier type overfall dams have been constructed using railroad rails, rock and old automobile frames as materials. These dams have an overfall height of ten feet and the gully section in between the dams is being stabilized by the construction of several gravity section dams, of an ogee type, made of dry rubble masonry.

Areas displaced by diversion ditches and contours will be reseeded and as soon as structural work is completed, trees will be planted in the gullies.

Cooperation between the State Officials and the Soil Conservation Technical Staff has been splendid. Warden Roy Best, who is in charge of the penitentiary, is an enthusiastic booster for Soil Conservation, and is pleased to have the opportunity to provide a new type of work for the convicts, and also to find a solution for the preservation of the land which has been threatened with total destruction.

-----SOIL CONSERVATION SERVICE-----

In the state of Colorado, we have 16 million acres severely eroded, 29 million in a state of moderate erosion - a total of 45 million out of the state's total of 66 million acres, something for us to think very seriously about.

FROM COLORADO PROJECT SOIL SURVEYS

"PRICKLY PEAR CACTUS" A PROBLEM IN PASTURE IMPROVEMENT WORK.

Hundreds of thousands of acres of Colorado pastures are overrun with cactus. There are pastures where cactus forms as high as 40 percent of the vegetative cover. Livestock will not eat it, without some sort of treatment to remove the spines, and the plants do well under conditions which are not favorable to grasses.

The common type of prickly pear found in pastures of eastern Colorado is one which is known in scientific circles as Opuntia polyacantha. It reproduces from seed as well as from sections of the plant, or directly from the roots of older plants.

The Soil Conservation Service has undertaken experimental work of eradication in an effort to find an effective way of eliminating cactus from our pastures. Dragging, scraping with a road grader, burning, grubbing, and chopping the plants are methods which are being tried on plats set aside for this purpose. Two plats are now under observation; one located three miles north and five miles east of Ellicott, Colorado, and another plat about six miles east of Ellicott on the Farmers' Highway.

-----SOIL CONSERVATION SERVICE-----

Good crop management increases the financial stability of farming. Good crop management also makes for the easy control of soil blowing. There is one idea about plains farming which is borne out both by scientific studies and practical experience. It is that the best use of the soil and moisture resources here can be had only by a system of changing crops and farming methods to suit changing seasonal conditions.

From Radio Address of H.H. Finnell, Regional Conservator, Soil Conservation Service, Amarillo, Texas.

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SOIL CONSERVATION SERVICE
COLORADO SPRINGS, COLORADO

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